

of Taraxacum extract from the root of the Dandelion (*Taraxacum officinale*) was received from Calcutta. To supply this demand, which was the first occasion on which Taraxacum extract was supplied from the Saharanpur Garden, the seeds were sown over about half an acre of land in August, and the roots were dug up during the month of March and thoroughly dried in the sun, after which they were reduced to fine powder, this powder was then put into water and allowed to stand one night. The mixture was strained through fine cloth, and the clear liquid was then heated in a water bath until it had acquired the proper consistency. During the heating process a certain quantity of rectified spirits of wine was added to the extract. The heating process being finished, the extract on becoming cool was put into suitable jars and despatched. Of the Chuffa or Earth Almond, the tubers of *Cyperus esculenta*, a native of South Europe and North Africa, Mr. Duthie reports that about two dozen tubers have been received from Dr. Schemburgk, of Adelaide, and of this number about one-half had started into growth and were thriving luxuriantly. The tubers of this plant are used as an article of food in Egypt and in some parts of Europe, and they are now recommended for feeding sheep, hogs, poultry, &c., for which purpose they are largely used in the Southern States of America. Of Lucerne (*Medicago sativa*) it is stated that the demand for seed is every year increasing. "In addition to its good qualities as a fodder plant for horses and oxen it has the further advantage of being a perennial, which is very little affected by the extremes of heat and moisture it has to endure in North India. The Argan (*Argania sideroxylon*), a valuable oil-producing tree of Morocco, has been received at Saharanpur, and every care will be taken with the plants should the seeds germinate. Mr. Duthie says, "I find from a list published in 1854 by the late superintendent, that the tree then existed in the Saharanpur Garden. As none of the original trees are now to be found it would appear that the climate of this part of India is not altogether suitable."

UNDER the title of a "Catalogue of the Phænogamous and Vascular Cryptogamous Plants of Indiana" we have received a small octavo pamphlet, giving as we believe the first complete catalogue of the flowering plants and ferns of the well-known State of Indiana. The flora numbers 1432 species referred to 577 genera, and no doubt further additions will from time to time be made. The authors of the useful flora are the editors of the *Botanical Gazette* of Crawfordsville (J. M. and M. S. Coulter) and Prof. C. Barnes.

THE last number of the *Zapiska* (Memoirs) of the Caucasian branch of the Russian Geographical Society contains a valuable paper by the late P. K. Ushar, on the "Oldest Traditions on Caucasus."

WE have just received the first part of a second series of Dr. C. Fr. W. Krukenberg's "Vergleichend-physiologische Studien," Heidelberg, 1882. This part, of over 180 pages, is taken up with a number of very important and interesting memoirs, on such subjects as "On the Temperature at which the Lymph of Invertebrates Coagulates," "On the Colour Substance of Feathers," "On the Protective Coverings of the Echinoderms," &c.

THE Polytechnic has at last been sold, and will finally close on January 21. Until then a varied programme will be presented daily, including new musical, optical, magical, and popular scientific entertainments, as well as a *réchauffé* of very many of those that have been characteristic of the place during the last twenty years.

A VERY favourable Report is to hand of the Sheffield Free Public Libraries and Museum. Many additions have been made to the latter, and the small observatory attached, and which is

open to the public, was visited during the year by about 3000 people.

ON December 29, 1881, two strong shocks of earthquake were felt at Kiangari, in the province of Kastamoumi. The movement was from east to west. Considerable damage was done to the village, but no details have yet been received at Constantinople.

WE have received from the Society of Telegraph Engineers a list of the additions to their library during the past year; this library, we may remind our readers, is now open to the public.

THE Waterford Literary and Scientific Association have begun to publish their Proceedings. The part for 1880-81 contains abstracts of various lectures and papers, and the fifth Annual Report records the steady success of the Association.

THE additions to the Zoological Society's Gardens during the past week include a Rhesus Monkey (*Macacus erythreus*) from India, presented by Mr. Wm. Trent; a Marsh Ichneumon (*Hippes galeri*) from South Africa, presented by Mr. Ernest Wells; an Indranee Owl (*Syrnium indranei*) from Ceylon, presented by Commander Burkitt; a Short-toed Lark (*Calandrella brachydactyla*), British, presented by Mr. H. A. Macpherson; a Pike (*Esox lucius*), British fresh waters, presented by Mr. George Seaton; a Malbrouck Monkey (*Cercopithecus cynosurus*) from West Africa, a Kinkajou (*Cercoleptes caudivolvulus*) from Brazil, a Black-footed Penguin (*Spheniscus demersus*) from South Africa, deposited; a Kusimanse (*Crossarchus obscurus*) from South Africa, a White eared Conure (*Conurus leucotis*) from Brazil, a Blue crowned Parrot (*Tanygnathus lucifer*) from the Philippines, purchased; a Molucca Deer (*Cervus moluccensis*), born in the Gardens.

PHYSICAL NOTES

THE vapour-tension of liquid mixtures has been lately investigated by Herr Konowalow (*Wied. Ann.*, No. 9) in the case of the first four members of the alcohol and the acid series, each mixed, in various proportions, with water. Curves were obtained by taking the percentages as abscissæ and the tensions as ordinates. The author finds that each mixture, to which a maximum or minimum of tension corresponds, has, at the temperature indicated, the same composition as its vapour. Thus liquid mixtures, with reference to distillation, are divisible into three groups—(a) Those whose curve of tension has neither a maximum nor a minimum; (b) Those whose curve has a maximum (e.g. propyl alcohol, butyric acid); (c) Those whose curve has a minimum (e.g. formic acid). Herr Konowalow shows, from a table of all the constant boiling mixtures known to him, that in all the boiling temperature of the mixture is either greater or less than those of both constituents, i.e. all the tension-curves have a maximum or a minimum. The existence of such a point seems, thus far, to be a necessary condition of the existence of a constant boiling mixture. These mixtures have not, apparently, a simple molecular constitution.

IN his study of sulphur Saint-Claire Deville obtained (from flowers of sulphur) a variety more stable than those known, and insoluble in sulphide of carbon; its form being that of a fine powder, each grain a hollow vesicle. He failed to find the specific gravity of this vesicular sulphur, and suggested to M. Spring, about a year ago, to subject the material to the powerful compressing apparatus used in his recent noteworthy experiments. This has been done (*Bull. Belg. Acad.* No. 8), with a pressure of 8000 atmospheres for a few seconds and temperature of 13°, producing hard pale yellow blocks. Treatment with sulphide of carbon showed that 4·21 per cent. was transformed into octahedral sulphur, so that the density of the vesicular variety is less than that of the other. M. Spring further directly determined the specific gravity of those blocks at different temperatures, measuring the expansion; and by calculation he reaches the result that vesicular sulphur has probably the same specific gravity as prismatic sulphur (1·960). It was also observed that vesicular sulphur dilates regularly under heat up to 43°, beyond which it contracts continually, till at 80° it has the same specific

gravity as at zero. This contraction M. Spring thinks probably due to transformation of vesicular into octahedral sulphur¹

In another paper to the Belgian Academy (*Bull.* No. 8) M. Spring concludes that there is a relation between the dilatation and the atomic weight of simple substances; for certain of them, as sulphur, selenium, and tellurium, nickel and cobalt, iron and aluminium, the former is inversely proportional to the latter. Otherwise expressed, the dilatation per atom (in the groups specified) is constant. The possibility is thus suggested of determining the number of atoms contained in a molecule of a solid substance. M. Spring is investigating this.

PROF. W. HOLTZ, inventor of the well-known Holtz electrical machine, has recently studied the various possible ways of arranging the inductors and armatures of his machine. This research was undertaken with a view partly to investigate the action of the analogous machine of Töpler, in which the fixed plate is not pierced as in the Holtz machine, and partly to ascertain the reasons for the shifting brushes of light to be observed in the ordinary Holtz machine. The research, which is too lengthy to reproduce here, led to the conclusion that there is an advantage in the apertures of the fixed plate.

To charge the electrodes of a secondary battery to their maximum potential requires a quantity of electricity roughly proportional to their surface. But if the source from whence the charge is derived is of an electromotive force inferior to this maximum, then the polarisation-charge is limited, not by the surface of the electrodes merely, but by the fact that the opposing polarisation completely stops the current. M. Blondlot has lately determined the quantities of charge required to polarise to such a limit a voltmeter of given electrodes, when the electromotive forces are also of given magnitude. This was done by using a voltameter with very small electrodes, and including in the circuit with it a battery, a ballistic galvanometer, and an apparatus for closing circuit during a determinate fraction of a second. By the device of increasing the area of one or other of the electrodes, M. Blondlot was able to study independently the two cases of polarisation by oxygen and of polarisation by hydrogen. The author further shows (*Journal de Physique*) that the elementary capacity of an electrode for a given electromotive force does not depend on the nature of the electrode. The latter is also proved by a single qualitative experiment. It follows that to charge, by an instantaneous polarisation, the electromotive force between an electrode and an electrolyte of value ϵ_1 to a value ϵ_2 , the same quantity of electricity is always required, whatever the chemical nature of the electrolyte. Further, the charge of the double electric layer at the surface of contact of an electrode and electrolyte does not depend on the nature of the electrolyte if the electric difference remains the same. M. Blondlot has also given an absolute measure of the initial capacity of platinum in water acidulated by sulphuric acid, and shows that this capacity may vary under different influences.

GEOGRAPHICAL NOTES

THE *Journal* of the Geographical Society of Tokio for the year 1881 has just been published. It is printed wholly in the Japanese character, and its contents are therefore inaccessible to all but a very few European readers. Besides reports of the meetings, and some other official information, it contains a paper on Saghalin and the Kurile Islands, and one on the historical geography of Japan. Some Japanese who have travelled in China have formed themselves into a society for publishing a topographical description of that country. This will contain little that will be new to English readers, as no Japanese has, we believe, penetrated into Central Asia from the side of China. The Japanese have given us much new information respecting Corea, but they have as yet added little else to our geographical knowledge.

MR. E. C. HORE's paper on Lake Tanganyika forms the staple of the January issue of the Geographical Society's *Proceedings*. The two maps which Mr. Hore furnishes are a valuable addition to the cartography of the lake, which is now for the first time delineated with any pretence to accuracy as a whole. The map of the southern part of the lake, Livingstone's Lake Liemba, is on the scale of five geographical miles to the inch. Mr. Markham's paper on the Jeannette expedition and Commodore Jansen's notes on recent Dutch Arctic voyages, and Mr. Leigh Smith's probable position we have already referred to at

some length, and in connection therewith need only add that a map is now given of Wrangel Island from Lieut. Berry's survey. The geographical notes bring us some interesting news of African exploration, chiefly on the east side of the continent, and hold out the hope of a future paper on the little-known interior of Mozambique by a new traveller.

THE first seven sheets of the large map of Eastern Equatorial Africa, with the preparation of which Mr. Ravenstein was entrusted in 1878 by the Council of the Geographical Society, are at last ready for issue by Mr. Stanford.

DR. HARMAND, who has for some time been an assistant secretary of the French Geographical Society, and has lately been appointed Consul for France at Bangkok, is shortly to avail himself of the opportunity thus offered for making natural history and ethnographical collections in the Indo-Chinese peninsula.

WE have received parts 27-29 of the new edition of Stieler's Hand Atlas, containing the following maps:—A railway and steamer map of Germany and neighbouring countries; Austria-Hungary; India and Inner Asia, northern sheet; a meteorological chart of the world; Iran and Turan; general map of South America; sheet 4 of the six-sheet map of South America; North-East Africa and America; South Africa and Madagascar. Other three parts, containing eight maps, will conclude the new issue of this Standard Atlas, which will have ninety-five maps in all.

THE *Deutsche Geographische Blätter* (Heft 4 Band 10) of the Bremen Society contains the narrative of the brothers Krause, sent by the Society to explore the Behring Straits region, mainly for commercial purposes. Capt. Koldeway contributes a paper on the position of the Arctic ice during the past summer, which was peculiar in some respects; Capt. Koldeway shows that it was dependent on meteorological conditions with which we are imperfectly acquainted, but for a knowledge of which the Arctic observing stations ought to do much. There is also a useful summary of the Arctic work of the year, in which it is claimed for Capt. Dallmann that he was the first to land on Wrangel Land in 1866. In a note on p. 448 of the "Voyage of the Vega," vol. i., Baron Nordenskjöld, however, thinks it strange that Dallmann should only now have mentioned this voyage.

SINCE 1873, Herr Dietrich Reimer of Berlin has published at intervals important contributions to the literature of African exploration, under the title of "Beiträge zur Entdeckungsgeschichte Afrikas." The first issue was a series of small maps showing the progress of a general knowledge of Africa from antiquity down to the nineteenth century. The second contains a paper on the part taken by Germany in African exploration, and a map, with text, showing what the various nationalities have done for African exploration during the nineteenth century. The third issue is a volume containing the journal of Dr. Paul Pogge during his exploration of the Lunda States, in the southern basin of the Congo in 1875-6. The fourth volume gives a narrative of Herr Otto H. Schütt's exploration on the Lower Quanza in 1877-9. These are all of considerable value, especially the two last issues, which contain the results of much detailed work by competent scientific observers. We trust Herr Reimer will be encouraged to continue his enterprise.

THE Vienna Geographical Society celebrated the twenty-fifth anniversary of its foundation on December 22 last. The Society numbers 74 honorary and 644 ordinary Members; its library consists of nearly 11,000 works.

THE geographical weekly *Das Ausland* has changed hands. Up to December 31 last its editor was the well-known geographer, Fr. von Hellwald; his place is now taken by Prof. Friedr. Ratzel of Munich. The paper will in future confine its contents solely to geographical and ethnographical subjects.

ACTION OF FREE MOLECULES ON RADIANT HEAT, AND ITS CONVERSION THEREBY INTO SOUND¹

THE lecture opens with a brief reference to the researches of Leslie, Rumford, and Melloni. The labours of Tyndall and Magnus, as far as they bear upon the present subject, are then succinctly sketched, their points of difference being

¹ Abstract of the Bakerian Lecture, by J. Tyndall, F.R.S., given at the Royal Society, November 24, 1881.